CHAPTER III
SURFACE WATER ASSESSMENT

Introduction

This chapter presents:

- Statewide surface water designated use attainment assessments
- Suspected sources and potential causes of aquatic life and recreational designated use impairments in selected watersheds in New Jersey.

An overview of designated use attainment in New Jersey's streams, rivers, lakes, estuaries and ocean waters is provided. These assessments were published previously in the *1996 State Water Quality Inventory Report* since New Jersey updates this aspect of 305(b) reporting every other reporting cycle (every four years).

Water quality conditions within the interstate waters are reported separately to USEPA through two interstate agencies: the Delaware River Basin Commission (P.O. Box 7360, West Trenton, NJ 08628) reports on the Delaware River and Bay; the Interstate Sanitation Commission (311 West 43rd Street, New York, NY 10036) reports on the Newark, Raritan, and New York Bays, the Hudson River, the Arthur Kill, and the Kill Van Kull. Readers are referred to the 1996 and 1998 Water Quality Inventory Reports issued by these agencies for complete assessments of these interstate waters. New Jersey's Report only delineates shellfish harvesting support and primary contact support within a limited portion of these interstate waters.

This chapter also includes the results of an assessment of the potential causes and suspected sources of exceedences of Surface Water Quality Standards (SWQS) criteria and aquatic life impairment in four Watershed Management Areas. The cause and source assessment was conducted on a pilot basis in the Passaic River Basin (WMAs 3, 4 and 6) and in the Cooper/ Rancocas/ Pennsauken Watersheds (WMA 19). This assessment includes the estimated magnitude of each source and cause and the estimated number of stream miles affected. Detailed watershed specific assessments are provided in the Appendix.

Designated Use Support Assessments

The following state-wide summaries of designated use support were originally presented in New Jersey's 1996 Inventory Report. Readers are referred to the 1996 Report for details and background information supporting these summaries. The title page of this report provides information on obtaining copies of the *1996 New Jersey State Water Quality Inventory Report*. The information presented here will be used by the USEPA to develop their 1998 National Water Quality Inventory Report to Congress.

To the extent possible, designated use assessments are presented in the context of environmental goals, milestones and indicators for water resources developed as part of a Results-Based Management System, which is described in Chapter V. Environmental goals, milestones and indicators were developed under the Results-based Management System with significant input

from water managers within NJDEP and stakeholders, including the regulated community, environmental groups and citizens. Through Watershed Management, it is expected that water goals, milestones and indicators will be tailored to meet watershed needs, and will inform the statewide effort.

Clean and Plentiful Water Goal

New Jersey's rivers, lakes and coastal waters will be fishable, swimmable and support healthy ecosystems. Surface and ground water will be clean sources of water. Every person in New Jersey will have safe drinking water. Adequate quantities of surface and ground water will be available for all needed uses.

Aquatic Life Designated Use Attainment in Non-tidal Rivers and Streams:

Aquatic Life Designated Use Milestone: By 2005, 50% of assessed non-tidal river miles will support healthy, sustainable, biological communities.

Aquatic life designated use support assessments are intended to evaluate attainment of Federal and State Surface Water Quality Standards provisions for the protection and propagation of a balanced population of shellfish, fish and wildlife.

Currently, NJDEP evaluates aquatic life designated use support in non-tidal rivers and streams using benthic macroinvertebrate monitoring. Benthic macroinvertebrate organisms, including insects, crustacea, snails and worms, are ubiquitous throughout the state's streams and are an important component of the aquatic food web. The occurrence of organisms that are tolerant and intolerant of pollution and habitat degradation is used to screen streams for potential impairments to aquatic life designated uses.

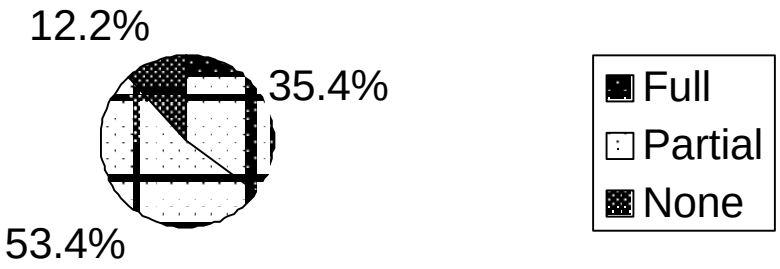
NJDEP currently monitors 763 stations for benthic macroinvertebrate populations on a rotating schedule so that stations are monitored once every 5 years. Each station in this Ambient Biological Monitoring Network (AMNET) was assumed to represent 5 miles of stream, 2.5 miles up and down stream of each monitoring station. Thus, 3815 miles of 6450 total miles (59%) are included in this assessment. Using a scoring system, the benthic macroinvertebrate population results were used to identify aquatic life designated use support for monitored stream miles as follows: **full support** (non-impaired), **partial support (**moderately impaired) and **no support (**severely impaired).

Based on data collected statewide between 1992 and 1996, (typically 1 sample event per station) 1,350 miles (35.4%) fully support the use, 2000 miles (53.4%) partially support the use and 465 miles (12.2%) do not support the use. See Figure III-1. Additional information about these results can be found in the Environmental Indicators Technical Report. (NJDEP, 1998).

These results were used to develop the Aquatic Life Designated Use Milestone: By 2005, 50% of assessed non-tidal river miles will support healthy, sustainable, biological communities. In order

to attain this milestone, the programs described in Chapter 5 and in the 1996 Water Quality Inventory Report will continue to be implemented. Specific commitments over the next 2 and 4 years are published in the NEPPS Performance Partnership Agreement and Strategic Plan, respectively. In addition, the preliminary source and cause assessment included in this report and Watershed Characterization and Assessment Reports highlight site-specific issues that can be addressed through the Watershed Management Program to protect and enhance aquatic life designated uses.

Figure III-1: Percent of Monitored Stream Miles Meeting Aquatic Life Designated Uses (1992-1996)



Note that comparison to previous aquatic life designated use assessments is not scientifically valid because assessment methods have changed over time. Previous methods included use of fish population data and use of chemical water quality data. Limitations in these methods lead to the use of benthic macroinvertebrate data, which are collected routinely statewide. In the future, assessments that integrate fisheries, benthic and chemical data sets will be explored.

Recreational Designated Use Attainment in Non-tidal Rivers and Streams

Recreational Designated Use Objective: Maintain and improve the current number and quality of suitable lake, ocean and bay bathing beaches in NJ.

Recreational designated use support assessments are intended to evaluate attainment of Federal and State Surface Water Quality Standards provisions for recreational uses of water, including swimming, wading and boating.

NJDEP evaluates recreational designated use support in non-tidal rivers and streams using levels

of fecal coliform bacteria as an indicator of sanitary quality. Fecal coliform bacteria levels in water provide an indication of pollution from fecal material, which may contain organisms that are harmful to human health. New Jersey's Surface Water Quality Standards include criteria for fecal coliform which are intended to protect recreational uses of water. The numerical criteria for FW2 streams are: *"fecal coliform levels shall not exceed a geometric average of 200/100 ml nor should more than 10% of the samples taken during any 30 day period exceed 400/100 ml"*. (NJDEP, 1998).

Swimmable designated use attainment assessments for freshwater rivers and streams in the 1996 (and included in 1998) Water Quality Inventory Reports were based on five years of fecal coliform monitoring data (1991 to 1995, inclusive) conducted five times per year. It is important to note that these stations are not located at designated bathing beaches. These data are reported as most probable number (MPN) of fecal coliform bacteria in 100 milliliters (ml) of water. Results were evaluated as follows:

- **Full Support of Swimmable Designated Use:** The geometric average was less than 200 MPN/100ml and less than 10 percent of individual samples exceeded 400 MPN/100 ml.

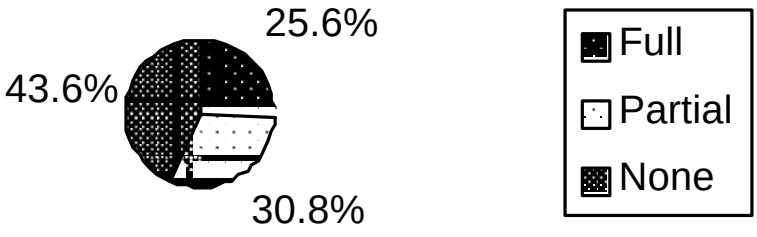
- **Partial Support of Swimmable Designated Use:** The geometric average was less than 200 MPN/ 100 ml, and more than 10 percent of individual samples exceeded 400 MPN/100 ml.

- **No Support of Swimmable Designated Use:** The geometric average exceeded 200 MPN/100 ml and more than 10 percent of individual samples exceeded 400 MPN/ 100 ml.

The recreational designated use assessment is based on fecal coliform concentrations in water samples at 79 non-tidal stream stations in the Ambient Stream Monitoring Network (ASMN). Each station in the ASMN was assumed to represent 5 miles of stream, 2.5 miles up and down stream of each monitoring station. Thus, a total of 390 of 6450 river miles (8.1%) have been monitored and assessed for recreational designated use attainment. Based on data collected between 1991 and 1995, 100 miles (25.6%) fully support the use, 120 miles (30.8%) partially support the use, and 170 miles (43.6%) do not support the use. See Figure III-2. Additional information about these results can be found in the Environmental Indicators Technical Report. (NJDEP, 1998).

This approach to swimmable designated use assessment was implemented in 1996 to improve consistency with New Jersey's Surface Water Quality Standards and EPA's 305(b) Guidance. For the 1990, 1992 and 1994 Water Quality Inventory Reports, the Department of Health's primary contact standard for designated swimming beaches was used to assess swimmable designated use. Full support of swimmable designated use was attained if 10 percent or less of individual samples exceeded 200 MPN/100 ml. Partial support of swimmable designated use was attained if 11 to 25 percent of individual samples exceeded 200 MPN/100 ml. No support of swimmable designated use was attained if greater than 25 percent of individual samples exceeded 200 MPN/100 ml. These percentages are based on EPA Water Quality Inventory Guidance, but only included one component of the Surface Water Quality Standard criteria for fecal coliform.

Figure III-2: Percent of Monitored Stream Miles Swimmable Designated Use (1991-1995)



Due to the change the "swimmable" assessment methodology, comparisons between current and past swimming use attainment are not scientifically valid. The change in methodology resulted in an increase in stream miles classified as fully and partially supporting swimmable designated use and a decrease in stream miles classified as not supporting swimmable designated use.

The stations monitored in this network do not include ocean, bay and lake bathing beaches. However, all surface waters in New Jersey are intended to have water quality that is suitable for swimming and fecal coliform bacteria and pathogenic pollution can be transported to bathing beaches potentially degrading water quality in designated swimming areas. Ocean and bay bathing beach assessments are provided under Recreational Designated Use Support for Coastal Waters. Lake bathing beach data are being compiled and assessed and results will be reported in a future Water Quality Inventory Report.

In order to improve sanitary water quality, the programs described in Chapter V and in the 1996 Water Quality Inventory Report will continue to be implemented. Specific commitments over the next 2 and 4 years are published in the NEPPS Performance Partnership Agreement and Strategic Plan, respectively.

Data collection and assessment is also expected to improve through implementation of the redesigned Ambient Stream Monitoring Program described in Chapter V. Specific improvements include collection of fecal coliform data during the summer to better reflect swimming as a recreational use of water and enhanced spatial coverage of assessments.

In addition, the preliminary source and cause assessment included in this report and watershed characterization and assessments highlight site-specific issues that can be addressed through the Watershed Management Plans to protect and enhance recreational designated uses.

Aquatic Life and Recreational Designated Use Support In Lakes

Lake eutrophication milestone or objective: not developed
There are approximately 380 public lakes in New Jersey, with a total of 24,000 acres. To date, 116 lakes, totaling 10,462 acres have been evaluated for trophic status and recreational water quality impairments through a combination of intensive surveys, diagnostic studies and lake water quality assessments. A total of 113 lakes, with a total of 10,351 acres, were considered to be eutrophic; 3 lakes totaling 111 acres were classified as mesotrophic. Data collection under the Clean Lakes Program is described in Chapter V.

The trophic status of lakes indicates the overall condition of the lake and can be used as an indirect indicator of aquatic life and recreational designated use attainment. Eutrophic lakes are characterized by high suspended sediment, nutrient and algal concentrations. Fish kills due to dissolved oxygen fluctuations may occur and eutrophic conditions generally lower the aesthetic and recreational value of the lake. Although all lakes naturally progress to eutrophic conditions, then become wetlands (especially those created as stream impoundments), this process is being accelerated by excessive inputs of nutrients and suspended sediments from point and nonpoint sources. In addition, most of New Jersey's lakes are shallow stream impoundments which were constructed for a variety of purposes including flood and sediment control. These shallow impoundments are highly prone to eutrophication.

For lakes that have not been assessed, the official status assigned by NJDEP's Clean Lakes Program is "Designated Water Uses Threatened, Pending Further Information." Professional judgment and the available dataset were used by the Clean Lakes Program to conclude that water quality in all of the state's lakes is either threatened or actively deteriorating with accelerated eutrophication. However, due to the project-specific nature of lake data collection, lake water quality trend data are not available. Lakes that have been studied and classified as eutrophic will be addressed through the Watershed Management Program.

Recreational Designated Uses in Lakes Milestone: By 2000, the recreational lake beach waters will have been assessed and water quality improvement projects will have been prioritized.

NJDEP is currently working with county and local health officials to compile and assess sanitary water quality data at lake bathing beaches throughout the state. Currently, 189 lake bathing beaches have been identified for assessment. Recreational designated use attainment in lakes will be published in future Water Quality Inventory Reports and Water Quality Indicator Reports published under NEPPS.

Recreational Designated Use Attainment in Coastal Waters

Recreational Designated Uses in Coastal Waters Milestone: By 2005, 100% of New Jersey's coastal recreational beach waters will be safe for swimming.

New Jersey ocean and bay bathing beaches are monitored for sanitary quality for primary contact recreation (swimming) by local environmental health agencies. Monitoring and data assessment are coordinated by NJDEP's Cooperative Coastal Monitoring Program (CCMP), which is described in Chapter V. Based upon the CCMP's assessments, the primary contact use support of New Jersey's coastal waters can be summarized as follows:

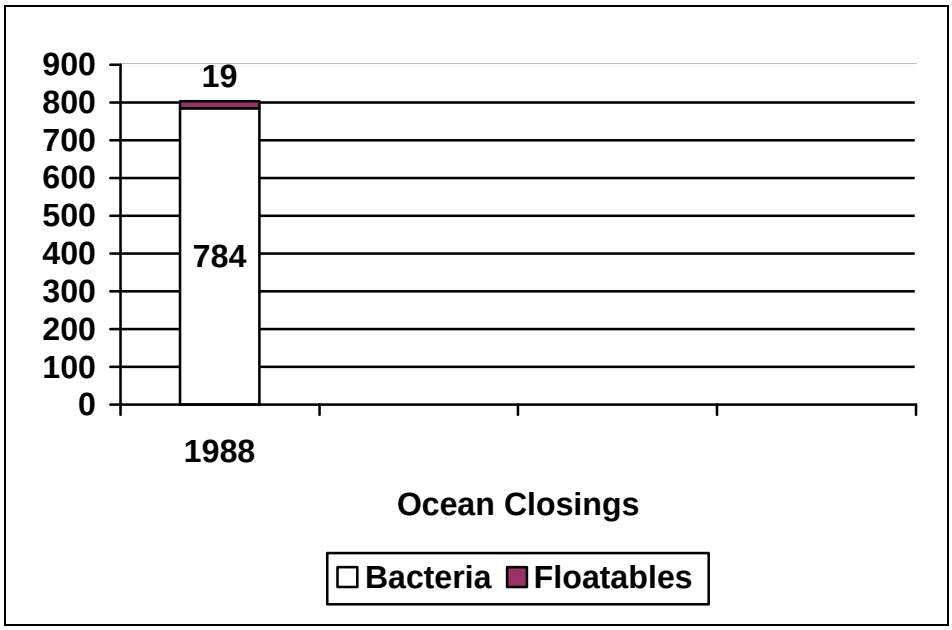
OCEAN: The Cooperative Coastal Monitoring Program (CCMP) monitoring results from the early 1980s up to 1998 indicate that the New Jersey's ocean beaches from Sandy Hook to Cape May are fully swimmable. Some beaches, however, are threatened by occasional short-term elevations of bacterial levels which have resulted in beach closures for brief periods. In the past, periodic closures have also occurred due to sewage infrastructure failure, floatables and oil spills. Beach closings due to pollution are less frequent than in the past. Ocean beach closings are depicted on Figure III-3.

Currently, 76% of New Jersey's 179 ocean and 138 bay beaches are not susceptible to recurrent beach closings. The ocean beaches from Sandy Hook south to Cape May are considered to be fully swimmable because closures are infrequent and short-term.

BAY AND ESTUARY: Bay bathing beaches, including those in interstate waterbodies, are monitored in the CCMP. Beach closure patterns vary, making generalizations difficult. Some locations are affected by only occasional short-term closures while others are subject to frequent closure. Some locations are severely affected and do not support primary contact designated use. Note: Interstate waters assessed by the Interstate Sanitation Commission (Raritan Bay) and the Delaware River Basin Commission (Delaware Bay) do not include assessments of recreational designated use attainment at beaches. Trends in bay beach closings are depicted on Figure III-4.

Through development of bathing beach indicators under NEPPS, additional quantitative information regarding ocean, bay and lake beach closings and recreational designated use attainment will be published.

Figure III-3: Ocean Beach Closings (1988 – 1998)



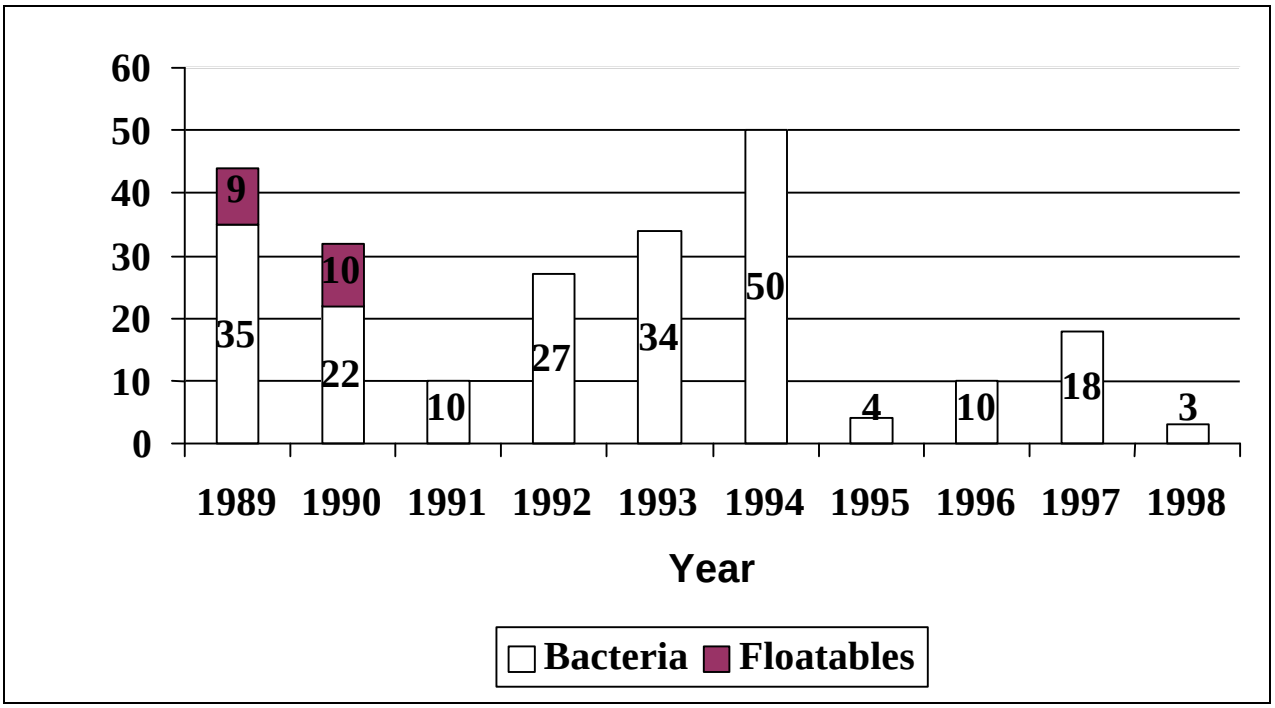
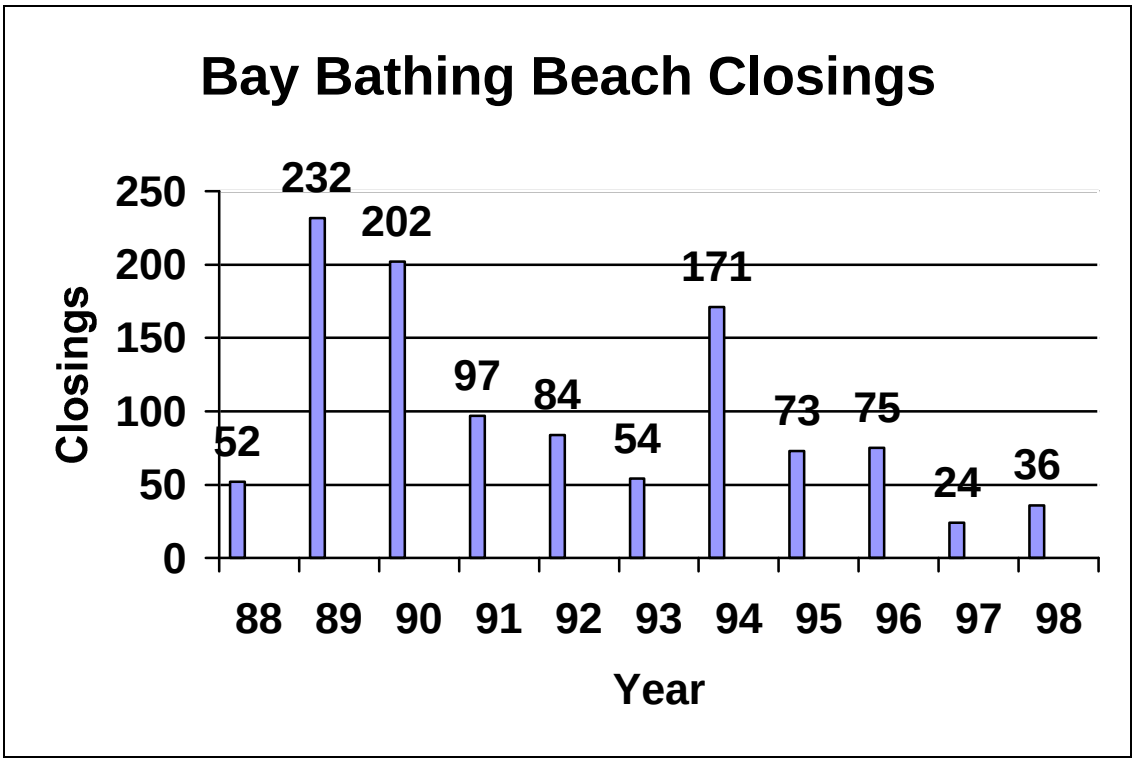


Figure III-4: Bay Beach Closings

All closures due to bacteria, none due to floatable material.



Shellfish Consumption Designated Use Attainment

Shellfish Consumption Designated Use Milestone: By 2005, 90% of New Jersey's classified waters will provide shellfish that are safe to harvest.

The Department monitors total coliform bacteria concentrations in shellfish and water, and uses the results to classify bay, estuarine and ocean waters shellfish harvesting. Currently, about 2500 stations are used to monitor 1053 square miles of waters classified for shellfish harvest in the Shellfish Sanitation Program. Monitoring is focused on areas with the potential for a harvestable shellfish resource. Areas around known pollution sources, such as sewage outfalls and marinas, are permanently closed to protect public health. Shoreline surveys and hydrographic tracing are performed to identify pollution sources. The National Shellfish Sanitation Program is described in Chapter V.

Based on 1996 data, 906 square miles (86%) of New Jersey's classified ocean, estuarine and bay waters provide shellfish that are safe to harvest, and 147 square miles (14%) do not support

shellfish harvest. Results for 1996 are presented in Table III-2.

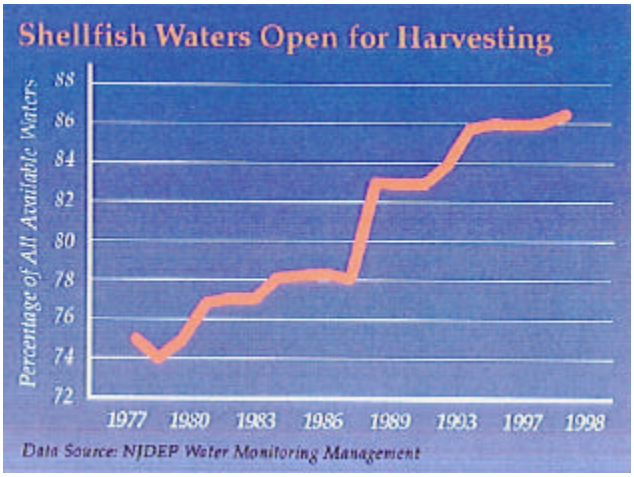
Table III-1: Shellfish Consumption Designated Use Attainment (in square miles, % of total)[1]

	Full Support but Threatened	Partial Support	No Support	Total Assessed
Bay and Estuary	458 (75%)	113 (18%)	43 (7%)	614
Ocean	335 (76%)	0 (0%)	104 (24%)	439
Total	**793 (75%)**	**113 (11%)**	**147 (14%)**	**1053**

Notes: Percent figures do not add to 100% due to rounding.
[1] Data are reported in square miles and as a percent of the total area assessed.
Full Support but Threatened: waters are harvestable without restriction; but are classified as threatened as per the National Shellfish Sanitation Program requirements. (NSSP, 1997).
Partial Support: waters that are open seasonally or require relay and depuration prior to harvest.
No Support: waters that are closed.
Waters in the "full support" and "partial support" categories are open for harvest, with or without special restrictions, and represent 86% of the total waters assessed in 1996.

New Jersey has been a national leader in maintaining and enhancing waters available for shellfish harvest. The shellfish waters that support harvesting have increased from 75% in 1977 to 86% in 1996 and 87% in 1998.

Figure III-5:



Fish Consumption Designated Use Attainment

Fish Consumption Designated Use Objectives:

- Reduce toxic contamination in fish tissue, and therefore reduce the need for fish consumption advisories.
- Evaluate fish tissue for contamination, update advisories and provide public education.

NJDEP participates on an Interagency Toxics in Biota Committee (TIBC) that focuses on toxic contamination in fish tissue that may be of concern to human health. As funds are available, NJDEP's Division of Science, Research and Technology conducts research projects to evaluate levels of contaminants in fish, shellfish and crustacea. As needed, fish consumption advisories are developed through the TIBC to protect human health.

In the mid-1980's, the NJDEP found elevated levels of PCBs, dioxins and pesticides (primarily chlordane) in finfish, lobsters, eels and crabs collected from New York-New Jersey interstate waters and from the Delaware River Estuary. In order to protect human health, commercial fishing bans and recreational fishing advisories have been issued by the State for affected species and waterways. Through a special appropriation from Governor Whitman, a study is being conducted to collect current data and update these advisories as appropriate.

More recently, New Jersey became one of 33 states that have enacted fish consumption advisories in response to mercury contamination. These consumption advisories have been issued for species consumed by recreational anglers (chain pickerel and largemouth bass), not commercially available species. Drinking water supplied from the affected waters has been tested and shown to be safe because the mercury resides primarily in sediments and aquatic life.

Application of the results of these studies to designated use attainment must be done with caution due to the following issues:

- Fish tissue monitoring is complex and expensive, hence, studies are often conducted only where fish tissue contamination issues are suspected and commercial or recreational fishing occurs. Therefore, a statewide overview of the magnitude and severity of this problem is not discernable from the data set.

- Fish are mobile animals and may have become contaminated in New Jersey waters or elsewhere.

- Pollution sources may be local (e.g., chlordane) or primarily transported from other states (e.g., mercury).

- Fish consumption advisories include provisions to protect sensitive populations (e.g., pregnant women, nursing mothers, small children).

- Several fish advisories are based on data that are more than 10 years old. A study is

underway to collect current data to update and revise these advisories as appropriate.

Fish consumption advisories that apply to New Jersey waters are summarized on Table III-2a and III-2b.

Table III-2a: Fish And Crab Advisories Based On PCBs, Dioxin Or Chlordane Contamination

LOCATION/ SPECIES	POLLUTANT	ADVISORY/PROHIBITION	
		General Population	High Risk Individual[1]
New Jersey-Statewide Note: local advisories may be more specific for the same species.			
American eel	PCBs	do not eat more than once a week	do not eat
Bluefish (over 6 lbs.)	PCBs	do not eat more than once a week	do not eat
Striped bass*	PCBs	consumption advisories vary by area; see below	consumption advisories vary by area; see below
American lobsters	PCBs	do not eat green glands (hepatopancreas)	do not eat green glands
Newark Bay Complex Newark Bay, Hackensack River downstream of Oradell Dam, Arthur Kill, Kill Van Kull, tidal portions of all rivers and streams that feed into these water bodies.			
Striped bass*	PCBs/Dioxin	do not eat	do not eat
American eel	PCBs	do not eat more than once a week	do not eat
Blue crab*	PCBs/Dioxin	do not eat or harvest[2]	do not eat or harvest[2]
Bluefish (over 6 lbs.), white perch, white cat fish	PCBs	do not eat more than once a week	do not eat
Newark Bay Complex Passaic River downstream of Dundee Dam and streams that feed into this section of the river.			
all fish and shellfish*	Dioxin	do not eat	do not eat
blue crab *	PCBs/Dioxin	do not eat or harvest[2]	do not eat or harvest[2]
Hudson River Hudson River includes the river downstream of NY-NJ border (about 4 miles above Alpine, NJ			
American eel *	PCBs	Do not eat more than once a week	Do not eat

LOCATION/ SPECIES	POLLUTANT	ADVISORY/PROHIBITION	
		General Population	High Risk Individual[1]
Striped bass *	PCBs	Do not eat more than once a week	Do not eat
Bluefish (over 6lbs.) white perch and white catfish	PCB	Do not eat more than once a week	Do not eat
Blue crab	PCBs/Dioxin	Do not eat green gland (hepatopancreas)[3]	Do not eat green gland[3]
Raritan Bay Complex This complex includes the New Jersey portions of Sandy Hook and Raritan bays, the tidal portions of the Raritan River (downstream of the Rte. 1 bridge in New Brunswick) and the tidal portions of all rivers and streams that feed into these water bodies.			
Striped bass *	PCBs	Do not eat more than once a week	Do not eat
Bluefish (over 6 lbs.), white perch and white catfish	PCBs	Do not eat more than once a week	Do not eat
Blue crab	PCBs/Dioxin	Do not eat green gland (hepatopancreas)[3]	Do not eat green gland (hepatopancreas)[3]
Northern Coastal Waters This area includes all coastal waters from Raritan bay south to the Barnegat Inlet.			
Striped bass *	PCBs	Do not eat more than once a week	Do not eat
Camden Area This area includes Strawbridge Lake, Pennsauken Creek (north and south branches), Cooper river and its drainage, Cooper River Lake, Stewart Lake and Newton Lake.			
All fish, shellfish and crustaceans *	Chlordane	Do not eat	Do not eat
Lower Delaware River & Bay Delaware River from Yardley, PA to the PA/DE border			
American eel	PCBs, Chlordane	Do not eat	Do not eat
Lower Delaware River & Bay Delaware River from Yardley, PA (across from Ewing Twp., NJ) south to the Chesapeake and Delaware Canal			
Channel catfish * White catfish White perch	PCBs, Chlordane	Do not eat Do not eat Do not eat	Do not eat Do not eat Do not eat

LOCATION/ SPECIES	POLLUTANT	ADVISORY/PROHIBITION	
		General Population	High Risk Individual[1]
Lower Delaware River & Bay Lower Delaware River includes the river between the PA Turnpike Bridge (I-276 bridge) in Burlington Twp. (Burlington County) and Birch Creek in Logan Twp. (Gloucester County about 2 miles below Commodore Barry Bridge			
Channel catfish *	PCBs, Chlordane	Do not eat	Do not eat
Lower Delaware River & Bay Delaware River from the DE/PA border south to the Delaware and Chesapeake Canal			
Striped bass *	PCBs	Do not eat	Do not eat
Lower Delaware River & Bay Delaware River from the Chesapeake and Delaware Canal (across from Salem, NJ) south to mouth of the Delaware Bay			
Striped bass * Channel catfish White catfish	PCBs	Do not eat more than five 8-ounce meals per year	Do not eat more than 3 4- ounce meals per year

* Selling any of these species from designed water bodies is prohibited in New Jersey.

[1] High risk individuals include: infants, children under the age of 15, pregnant women, nursing mothers and women of childbearing age. They are advised not to eat any such fish or crabs taken from the designated regions since these contaminants have a greater impact on the developing young.

[2] No harvest means no taking or attempting to take any blue crabs from these waters.

[3] Interim recommendation based on research showing elevated levels of chemical contaminants in the blue crab hepatopancreas, also called the green gland.

Table III-2b: Consumption Advisories for Mercury for Largemouth Bass and Chain Pickerel from New Jersey Freshwaters

Location	**Species**	**Advisory + General Population**	**Advisory + High-Risk Individual***
New Jersey Statewide			
For all freshwater bodies (except those listed below)	bass and pickerel	do not eat more than once a week	do not eat more than once a month
Pinelands Area			
For all water bodies (except those listed below)	bass and pickerel	do not eat more than once a month	do not eat
Site-Specific Pinelands			
Lake Lenape	bass pickerel	do not eat more than once a week do not eat more than once a week	Do not eat do not eat more than once a month
Mirror Lake	bass pickerel	No restrictions No restrictions	do not eat more than once a month do not eat more than once a week

Location	Species	Advisory + General Population	Advisory + High-Risk Individual*
Stafford Forge	bass pickerel	do not eat more than once a month do not eat more than once a week	Do not eat Do not eat
Wading River	bass pickerel	do not eat more than once a month do not eat more than once a week	Do not eat Do not eat
Site-Specific Statewide			
Assunpink Creek	bass pickerel	No restrictions Do not eat more than once a week	Do not eat more than once a week Do not eat more than once a month
Atlantic City Reservoir - No Fishing Allowed	bass pickerel	Do not eat Do not eat	Do not eat Do not eat
Big Timber Creek	bass pickerel	No restrictions do not eat more than once a week	do not eat more than once a week do not eat more than once a month
Canistear Reservoir	bass pickerel	do not eat more than once a week do not eat more than once a week	Do not eat Do not eat more than once a month
Clinton Reservoir	bass pickerel	do not eat more than once a week do not eat more than once a week	do not eat do not eat more than once a month
Cranberry Lake	bass pickerel	do not eat more than once a week No restrictions	do not eat more than once a month do not eat more than once a month
Crosswicks Creek	bass pickerel	No restrictions do not eat more than once a week	do not eat more than once a week do not eat more than once a month
Crystal Lake (Burlington County)	bass pickerel	No restrictions Do not eat more than once a week	do not eat more than once a week do not eat more than once a month
Delaware River (Easton to Trenton)	bass pickerel	No restrictions Do not eat more than once a week	do not eat more than once a month do not eat more than once a month
Delaware River (Trenton to Camden)	bass pickerel	No restrictions do not eat more than once a week	do not eat more than once a week do not eat more than once a month
Lake Carasaljo	bass pickerel	do not eat more than once a week No restrictions	Do not eat do not eat more than once a month
Lake Hopatcong	bass pickerel	No restrictions No restrictions	do not eat more than once a month do not eat more than once a month
Manasquan Reservoir	bass pickerel	do not eat more than once a month do not eat more than once a week	Do not eat do not eat more than once a month
Merrill Creek Reservoir	bass pickerel	do not eat more than once a week do not eat more than once a week	Do not eat do not eat more than once a month
Monksville Reservoir	bass pickerel	do not eat more than once a week do not eat more than once a week	Do not eat Do not eat more than once a month
Rockaway River	bass pickerel	do not eat more than once a week No restrictions	Do not eat more than once a month Do not eat more than once a month
Round Valley Reservoir	bass pickerel	No restrictions do not eat more than once a week	do not eat more than once a month do not eat more than once a month
Shadow Lake	bass pickerel	No restrictions do not eat more than once a week	do not eat more than once a week do not eat more than once a month
Spruce Run Reservoir	bass pickerel	No restrictions do not eat more than once a week	do not eat more than once a month do not eat more than once a month
Swartswood Lake	bass pickerel	Do not eat more than once a week No restrictions	do not eat more than once a month do not eat more than once a week
Union Lake	bass pickerel	do not eat more than once a month do not eat more than once a month	Do not eat Do not eat
Wanaque Reservoir	bass pickerel	do not eat more than once a week do not eat more than once a week	Do not eat Do not eat

Location	Species	Advisory + General Population	Advisory + High-Risk Individual*
Wilson Lake	bass pickerel	do not eat more than once a week do not eat more than once a week	Do not eat more than once a month Do not eat
Woodstown Memorial Lake	bass pickerel	No restrictions do not eat more than once a week	do not eat more than once a month do not eat more than once a month

Notes: + One meal is defined as an eight-ounce serving.
* High risk individuals are pregnant women, women planning pregnancy within one year, nursing mothers and children under five years old.

Status and Trends in Surface Water Quality

Surface water quality standards, including numerical criteria, are designed to protect human health and aquatic life uses. Through a research project, status with respect to applicable surface water quality criteria and trends over time were evaluated. Results were used to develop water quality indicators reported in the Environmental Indicators Technical Report (NJDEP, 1998). Status with respect to numerical surface water quality criteria between 1991 and 1994 and trends between 1974 and 1994 are summarized on Table III-3 and shown graphically on Figure III-6. In the future, status and trends results from this and other projects will be assessed using EPA Guidance for 305(b) Reports and displayed on maps.

Table III-3: Summary of Surface Water Quality Status and Trends

	Standard Met (1991-1994) (1)			Standard Not Met (1991-1994) (2)			# Stations
Trend : 1974-1994	**Improving**	**Stable**	**Declining**	**Improving**	**Stable**	**Declining**	
Dissolved Oxygen (3)	13	53	12	1	3	1	83
Nitrate	5	32	46	0	0	1	83
Un-ionized Ammonia	35	22	7	2	2	1	69
Total Nitrogen(4)	73	10	0	NA	NA	NA	83
Total Phosphorus	6	2	1	31	36	7	83
Fecal Coliform	0	4	0	4	57	14	75
Suspended Solids (5)		61			23		84

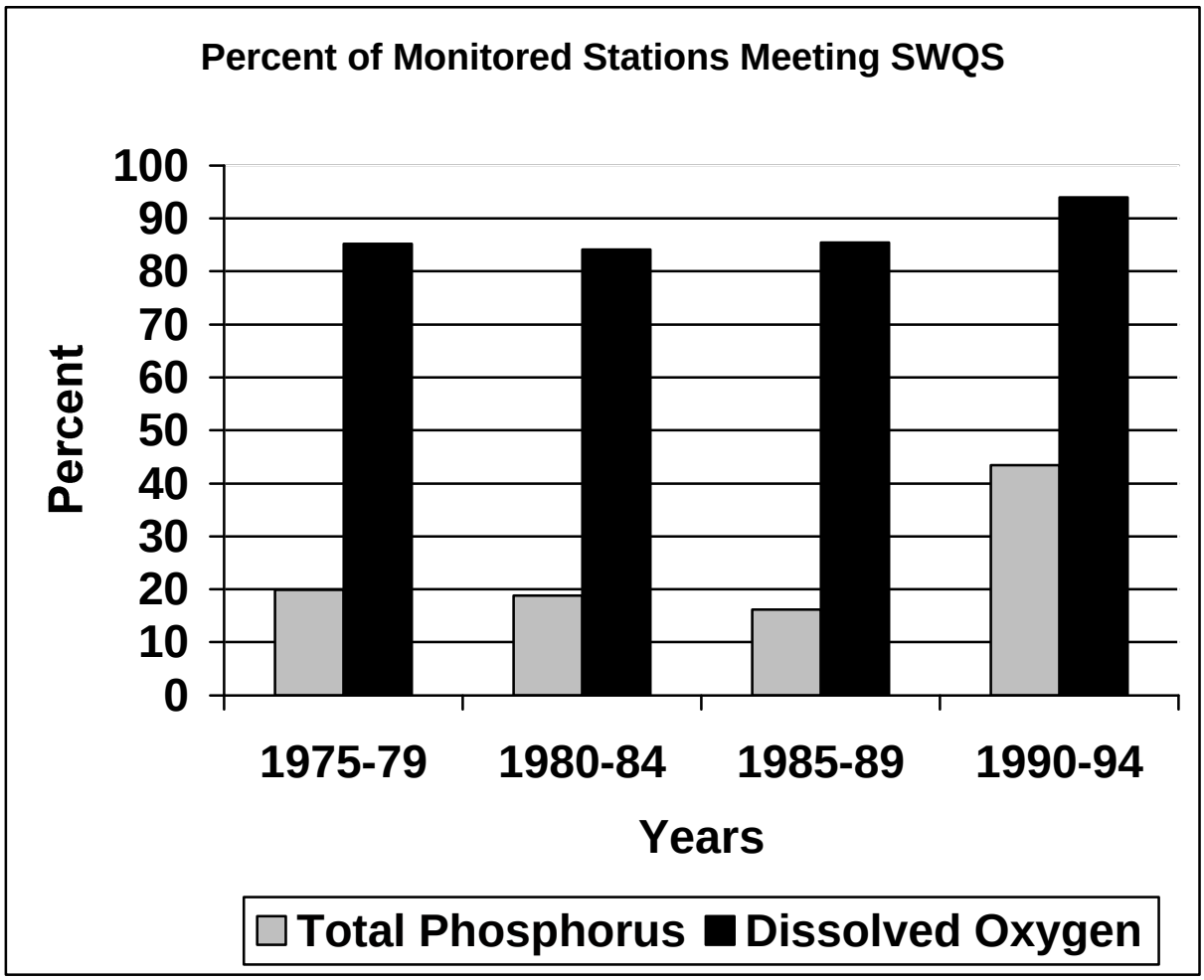
Notes:
1. Standard met: 100% of samples collected 1991-94 met applicable SWQS criteria.
2. Standard not met: <100% of samples collected 1991-94 met applicable SWQS criteria
3. Dissolved oxygen: summer data only; exceedences may be underestimated due to lack of diurnal data.
4. Total nitrogen: No applicable SWQS criteria available
5. Suspended solids: Insufficient data available for trends

As shown below on Figure III-6, the percent of monitored stations meeting Surface Water Quality Standards (SWQS) for dissolved oxygen and total phosphorus has increased over the 20 year period. For dissolved oxygen, the percent of monitored stations that met the criterion increased from 85.2% for the 1975-1979 monitoring period to 94% for the 1990-1994 monitoring period. For total phosphorus, the percent of monitored stations that met the criterion increased from 19.9% for the 1975-1979 monitoring period to 43.4% for the 1990-1994

monitoring period. Additional data for the 1995-1997 period, prior to the implementation of the redesigned Ambient Stream Monitoring Network, will be reported in the next Water Quality Inventory Report.

Stations with fewer than 10% of samples exceeding the applicable criterion in a five year monitoring period were considered to have met the SWQS. This approach is consistent with EPA Guidance for Water Quality Inventory Reporting. It is important to note that over the 20 year period, monitored stations may have changed.

Figure III-6: Percent of Monitored Stations Meeting Surface Water Quality Standards



Potential Causes Of Use Impairment And Suspected Sources Of Pollution

PLACEHOLDER- An improved cause and source assessment methodology is being developed and implemented. Results for the four Watershed Management Areas in the Passaic Basin and Cooper/Pennsauken/Rancocas (WMAs 3,4,6,19) will be available for review by July 31,1999 and submitted to EPA as final by August 31, 1999

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